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Dixon County Test Hole Logs

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DIXON COUNTY Test-Hole Logs

Raymond R. Burchett and Frank A. Smith

**Nebraska Water Survey
Test-Hole Report No. 26**

**Conservation and Survey Division
Institute of Agriculture and Natural Resources
University of Nebraska-Lincoln**



April 1992



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The division is authorized to enter into agreements with federal agencies to engage in cooperative surveys and investigations in the state. Publications of the division and the cooperating agencies are available from the Conservation and Survey Division, University of Nebraska, Lincoln, Nebraska 68588-0517.

The Conservation and Survey Division provides information and educational programs to all people without regard to race, color, national origin, sex or handicap.

Publication and price lists are furnished upon request.

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INTRODUCTION

In 1930, the Conservation and Survey Division of the University of Nebraska and the U.S. Geological Survey began a program of cooperative groundwater studies in Nebraska. Since then test drilling by use of rotary drilling equipment has been an integral part of that program. This report contains logs of all the test holes drilled in the county under the program as well as those drilled by the Conservation and Survey Division with financial assistance from other government agencies.

The map in this report, Figure 1, page vi, shows the location of all test holes drilled in the county since 1930.

Present techniques of test-hole logging and sampling include use of drilling mud suitable to drilling conditions, timing by stopwatch of the drilling of each 5-foot increment of depth, and removal of all cuttings from the test hole at intervals of 5 feet or less. During the drilling of the hole, cuttings from each interval are examined immediately; samples representing each 5-foot interval and each recognizable change in material are retained. After samples are washed, they are described lithologically and the color is evaluated by comparison with standard color charts. The samples then are dried, stored, and cataloged. Beginning in September 1951, the test holes have been logged electrically. All samples are processed and kept on open file in the offices of Conservation and Survey Division, 113 Nebraska Hall, University of Nebraska-Lincoln, 68588.

This publication is one of a series being issued to make more readily available the record of test holes drilled since 1930. The series of publications is made on a county basis and includes, with some exceptions, logs of all test holes drilled in each of the counties. The logs have not been reviewed for conformance with editorial standards and nomenclature.

The method whereby the altitude of the land surface at testhole sites was determined is indicated in the heading of each log, as follows: a = altimeter, h = hand leveling, i = spirit leveling, t = estimated from topographic map.

The test-hole records accurately reflect subsurface conditions only at the locations where the test holes were drilled. Interpretive data reflecting probable subsurface conditions between test-holes are being compiled for publication in county reports and are available for inspection in the office of the Conservation and Survey Division.

Each test hole is identified by a number assigned in the field (for example #3-B-67, #41-79), and most are also identified by a number indicating its location within the land divisions of the U.S. Bureau of Land Management's survey of Nebraska. Location numbers of test holes east of the 6th principal meridian, which passes through Columbus in a north-south direction, are preceded by the capital letter A; those west of the principal meridian have no preceding letter. The first numeral indicates the township, the second the range, and the third the section. As shown in figure 2, page vii, the letters that follow the section number indicate the location of the test hole within the section, the first letter indicating the quarter section and the second letter indicating the quarter-quarter section. The letters A, B, C, and D are applied in counterclockwise direction beginning with A in the northeast quadrant. The last numeral is the serial number of the test hole within the quarter-quarter section. No number is shown unless more than one test hole is within the given quarter-quarter section.

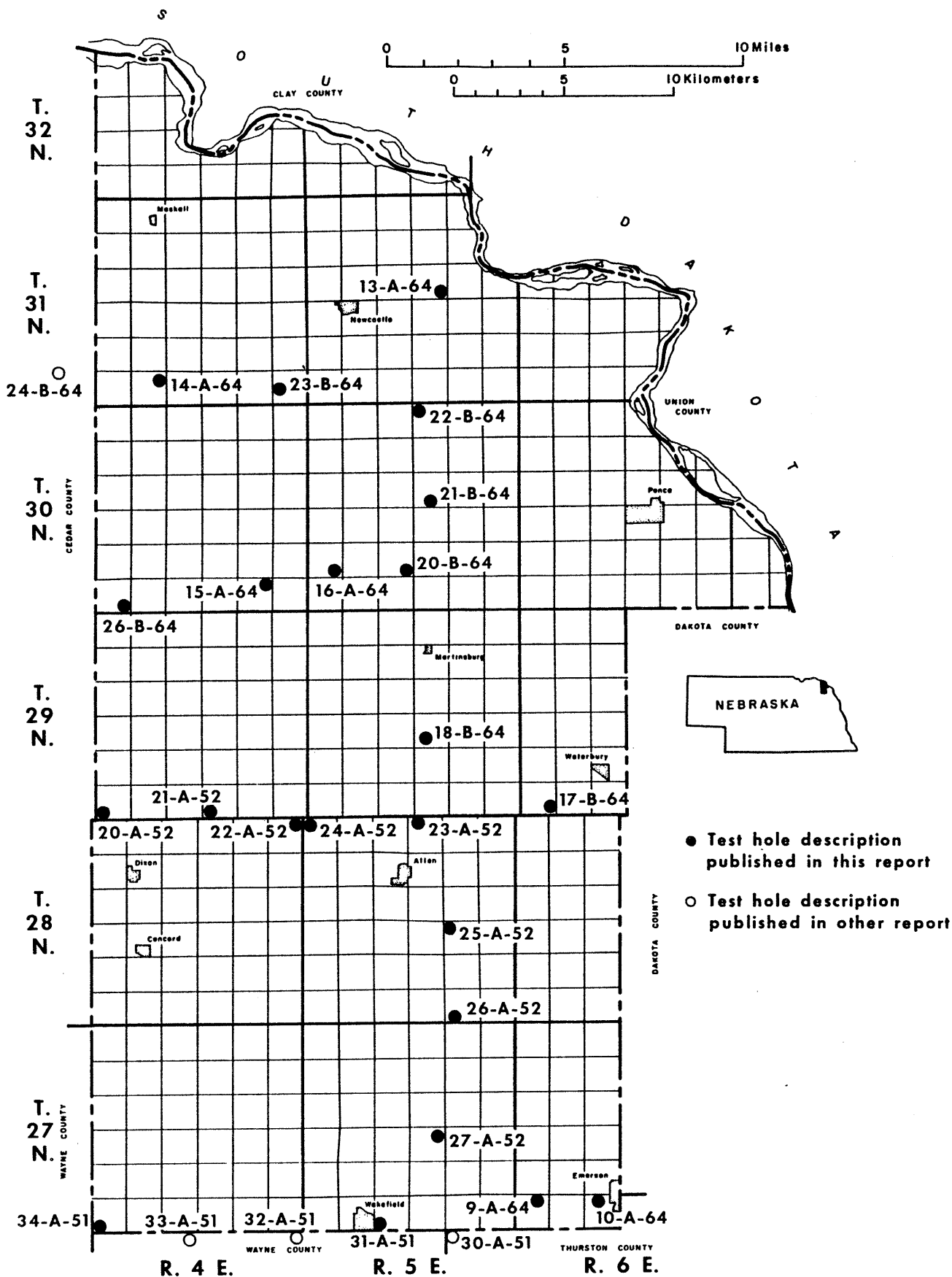
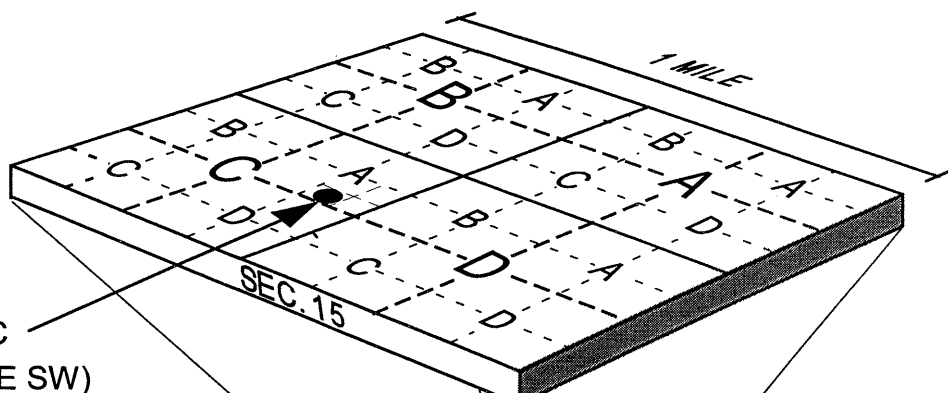


Fig. 1. Test-hole location map of Dixon County.

A = NE 1/4
 B = NW 1/4
 C = SW 1/4
 D = SE 1/4
 1 Section =
 1 Mile² =
 640 Acres



5N-4E-15CADC
 (5N-4E-15 SW NE SE SW)
 (SW 1/4 SE 1/4 NE 1/4 SW 1/4 sec. 15,
 T. 5 N., R. 4 E.)

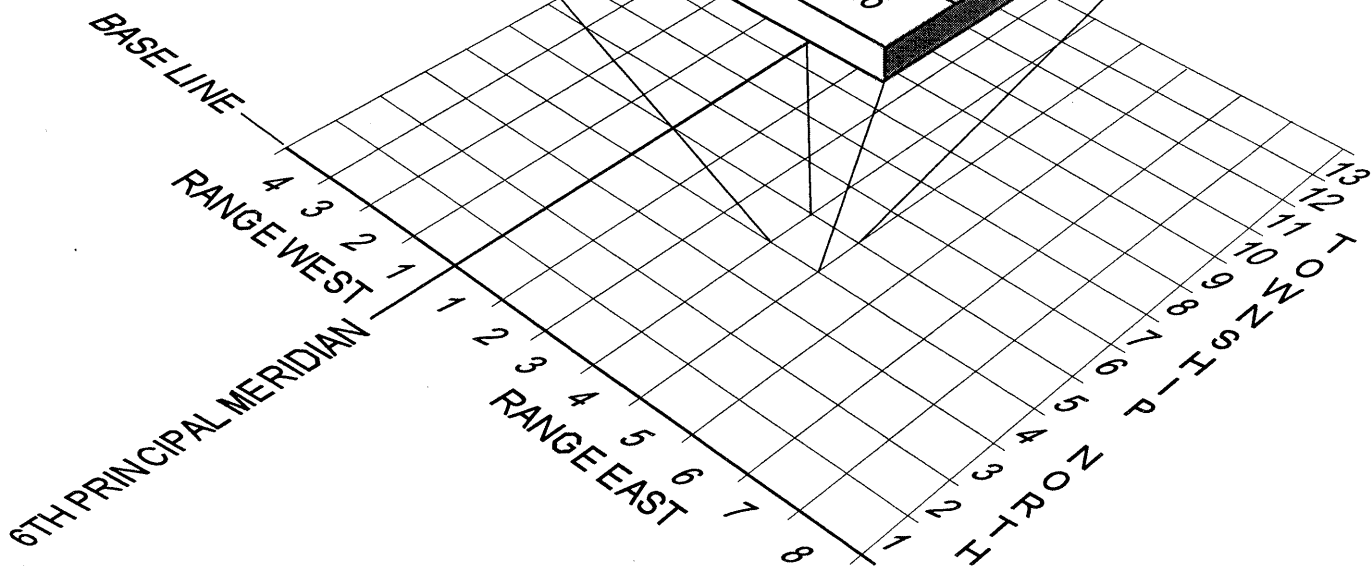
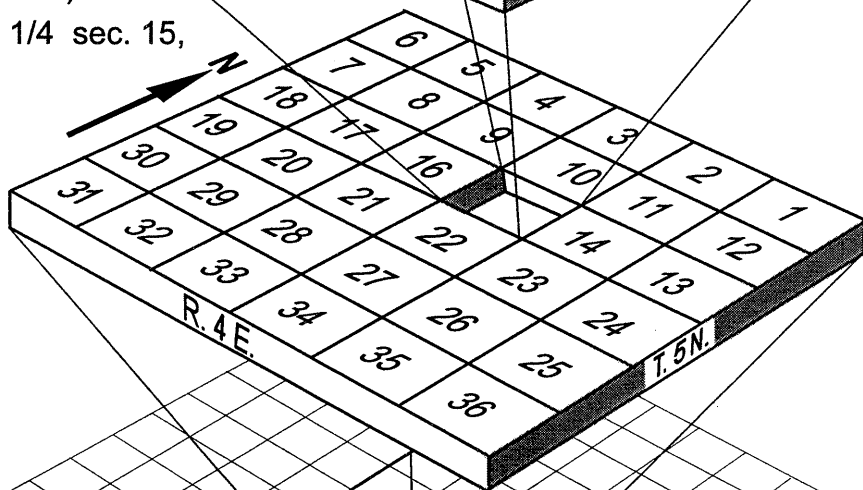


Fig. 2. System for identifying test-hole according to its location.

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28N 04E 01AABB	22-A-52	11
28N 05E 03ABBB	23-A-52	12
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Test-hole logs are arranged in this publication by township, range and section.

Test Hole #34-A-51
(A27-4-31ccbc)
Dixon County

Location: SW NW SW SW sec. 31, T. 27 N., R. 4 E., approximately
 655 feet north and 71 feet east of southwest corner.
 Ground elevation: 1,524.0 ft. (t). (Laurel SE 7.5 min. quadrangle).
 Depth to water: 67.5 ft. (9-28-51).

Depth, in feet
 From To

Quaternary System, undifferentiated:

Soil, silt, moderately clayey, moderately calcareous, medium brown.....	0.0	1.0
Silt, slightly to moderately clayey, moderately calcareous, medium brownish yellow; slightly clayey and in part light brownish yellow below 2 ft.....	1.0	18.0
Silt, slightly clayey and moderately to very sandy, slightly calcareous, medium brown; contains very fine to medium sand.....	18.0	20.0
Silt, very sandy, to sand, very silty, slightly calcareous, medium brown; texture of sand grades from very fine to medium.....	20.0	29.5
Silt, slightly clayey to slightly sandy, slightly calcareous, light brown; contains a few dark concretions and some mottled light gray below 30.5 ft.....	29.5	33.0
Silt, slightly clayey, slightly calcareous, light yellowish brown; texture of silt grades from fine to coarse.....	33.0	35.0
Silt, moderately to very sandy, slightly calcareous, medium brown; contains very fine to fine sand; medium yellowish gray with some mottled brown below 40 ft.....	35.0	48.0
Silt, slightly sandy, slightly calcareous, light brownish gray and light brownish yellow; texture grades from silt to very fine sand.....	48.0	49.0
Silt, slightly clayey, moderately calcareous, light brownish yellow; texture of silt grades from fine to coarse.....	49.0	50.0
Silt, sandy, moderately calcareous, medium brown with a yellow tint; contains very fine to fine sand.....	50.0	52.0
Silt, slightly clayey, moderately calcareous, medium yellowish gray; medium brownish yellow below 54 ft.....	52.0	60.0
Silt, slightly clayey, slightly calcareous, medium brownish gray; contains a trace of mottled yellowish brown.....	60.0	63.0
Clay, moderately silty, medium brownish gray.....	63.0	68.5

Silt, moderately clayey, medium brown; contains a little mottled yellowish brown; moderately to very clayey below 71 ft; contains a darker layer from 70.5 to 71 ft.....	68.5	77.0
Silt, moderately to very clayey, light brownish gray; contains a trace of very fine sand; medium brown from 79.5 to 80 ft; slight pink tint below 80 ft.....	77.0	82.0
Silt, moderately to very clayey, medium brown with a pink tint; contains a trace of fine to very coarse sand below 85 ft.....	82.0	86.0
Silt, moderately clayey, medium brown; texture of silt grades from fine to coarse; contains a trace of very fine to medium sand below 95 ft; contains a trace of black mottling below 90 ft.....	86.0	98.0
Silt, very clayey, light brownish gray; contains a trace of embedded sand.....	98.0	100.0
Silt, moderately clayey to moderately sandy, light brownish gray; contains very fine to fine sand; contains some dark concretions.....	100.0	104.5
Silt, slightly to moderately clayey, light brownish gray.....	104.5	108.0
Silt, slightly clayey and moderately to very sandy, light brownish gray; contains very fine to medium sand with a trace of coarse to very coarse sand...	108.0	110.0
Sand and gravel, texture grades from medium sand to medium gravel.....	110.0	111.5
Silt, sandy, medium brown.....	111.5	114.5
Clay, very sandy, medium gray; contains very fine sand.....	114.5	117.0
Clay, moderately to silty, light pinkish gray, very silty; light brownish gray below 122.5 ft.....	117.0	125.0
Silt, slightly clayey, light brownish gray.....	125.0	127.2
Gravel and pebbles, heterogeneous composition.....	127.2	130.0
Till: clay, silty to moderately sandy, moderately calcareous, medium gray; contains sand and pebbles; slightly sandy below 140 ft.....	130.0	142.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Carlile Formation:		
Shale, medium gray, clayey, moderately calcareous from 140 to 147 ft. and from 150 to 153 ft; in part slightly calcareous from 147 to 150 ft, and from 153 to 154.5 ft.....	142.0	155.0
Shale, dark gray, clayey to moderately sandy; contains very fine with a trace of fine sand.....	155.0	158.5
Shale, dark gray, clayey, medium gray below 160 ft..	158.5	170.0

Test Hole #27-A-52
(A27-5-22aadd)
Dixon County

Location: SE SE NE NE sec. 22, T. 27 N., R. 5 E., approximately
 1,050 feet south and 19 feet west of northeast corner.

Ground elevation: 1,550.0 ft. (t). (Wakefield 7.5 min. quadrangle).

Depth to water: Unknown

Depth, in feet
 From To

Quaternary System, undifferentiated:

Silt, slightly clayey, moderately calcareous, medium yellowish gray, slightly lighter in color from 5 to 13 ft; contains a few limy nodules from 0 to 13 ft.....	0.0	16.5
Silt, slightly to moderately clayey, moderately calcareous, medium brownish yellow; medium yellowish gray below 28.5 ft; non-calcareous below 30 ft....	16.5	34.0
Silt, moderately clayey, medium brown; moderately to very clayey below 36.5 ft; contains many iron-manganese concretions from 36.5 to 38 ft.....	34.0	39.0
Clay, moderately silty, medium brown; very silty below 43 ft; medium yellowish brown.....	39.0	45.0
Clay, moderately silty, medium brown.....	45.0	48.2
Silt, very clayey, light brown; moderately to very clayey below 52 ft; medium brown with a yellow tint below 54 ft.....	48.2	60.0
Silt, slightly clayey to slightly sandy, light brown; texture of sand grades from fine to coarse; contains very fine sand; moderately clayey below 63 ft.....	60.0	63.0
Silt, moderately clayey, medium brown; texture of silt grades from fine to coarse.....	63.0	64.0
Silt, very clayey, medium brown with a gray tint....	64.0	65.0
Silt, moderately to very clayey, medium brown with a yellow tint; very clayey from 69 to 70 ft; moderately clayey and slightly lighter in color below 70 ft.....	65.0	71.5
Silt, very clayey, medium brown.....	71.5	73.0
Clay, moderately to very silty, medium brown; light brown below 74.5 ft.....	73.0	75.0
Silt, very clayey, light brown with a yellow tint...	75.0	80.0
Clay, moderately to very silty, light brown with a yellow tint; slightly to moderately silty below 85 ft; contains a few limy nodules from 85 to 88.5 ft; medium brownish gray from 88.5 to 90 ft; light brown below 90 ft.....	80.0	95.0
Clay, slightly silty, light brown; contains a few limy nodules below 100 ft; moderately to very silty below 104.5 ft.....	95.0	105.0

Silt, medium yellowish gray; granular structure; slightly clayey below 106 ft; less granularity....	105.0	109.5
Clay, moderately to very silty, medium yellowish gray; light brownish gray from 110 to 113.5 ft; medium gray from 113.5 to 115 ft.....	109.5	115.0
Clay, moderately to very silty, moderately calcareous, light yellowish gray.....	115.0	116.5
Till: clay, moderately silty to sandy, moderately calcareous, medium yellowish gray; contains sand with a little gravel and pebbles; very sandy from 119 to 119.8 ft; slightly sandy from 125 to 126.8 ft; slightly silty to very slightly sandy from 126.8 to 129 ft; medium brownish gray and contains a calcareous cemented layer from 126.6 to 126.8 ft.....	116.5	129.0
Till: clay, moderately silty to slightly sandy, moderately calcareous, medium yellowish gray; contains sand with a trace of gravel and pebbles; light yellowish gray from 130 to 132.5 ft; some mottled gray below 145 to 152 ft; medium gray from 152 to 155 ft, 156 to 160 ft, and from 163 to 163.4 ft; medium brownish yellow from 160 to 163 ft; boulder below 163.4 ft; dark grayish green....	129.0	164.5

Test Hole #31-A-51
(A27-5-33cccd)
Dixon County

Location: SE SW SW SW sec. 33, T. 27 N., R. 5 E., approximately 6 feet north and 421 feet east of southwest corner.

Ground elevation: 1,390.0 ft. (t). (Wakefield 7.5 min. quadrangle).

Depth to water: 22.9 ft. (9-12-51).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Road fill.....	0.0	0.5
Soil, silt, moderately clayey, dark brownish gray...	0.5	1.5
Silt, slightly to moderately clayey, medium yellowish gray with a brown tint; medium brownish yellow below 2 ft.....	1.5	4.5
Silt, slightly clayey, light brownish yellow; slightly calcareous below 6.5 ft; contains some mottled light gray; contains limy concretions from 6.5 to 12.5 ft.....	4.5	20.0
Silt, slightly clayey, slightly calcareous, light yellowish gray with some mottled brown and light gray; light brownish gray below 27.5 ft; contains a trace of very fine sand.....	20.0	28.5
Silt, slightly clayey, slightly to moderately calcareous, medium gray; contains a trace of very fine sand; contains a few snails below 33.5 ft; contains a few limy nodules below 35 ft.....	28.5	41.5
Silt, moderately clayey, moderately calcareous, medium gray, interbedded with some sand, light and dark silicates; texture grades from very fine to coarse.....	41.5	45.0
Silt, slightly clayey to slightly sandy, moderately calcareous, medium gray; contains very fine sand..	45.0	47.0
Sand and gravel, quartz with many gray and green silicates and with some limy grains; texture grades from medium sand to medium gravel; contains 70 percent gravel from 47 to 50 ft; 40 to 50 percent gravel below 50 ft; consists of quartz with pink silicates below 55 ft.....	47.0	60.5
Clay, very silty, light yellowish gray with some dark brownish yellow.....	60.5	61.2
Silt, very clayey, light gray; texture of silt grades from fine to coarse.....	61.2	62.2
Silt, moderately clayey, light yellowish gray; texture grades from fine to coarse	62.2	64.5
Sand, quartz with some pink silicates; texture grades from fine to very coarse sand with much medium to coarse sand.....	64.5	66.0
Silt, moderately clayey, light olive gray.....	66.0	67.0

Sand, quartz with some pink silicates; texture grades from fine to very coarse.....	67.0	69.0
Silt, slightly clayey, light gray with a blue tint..	69.0	70.0
Silt, very clayey to slightly sandy and gravelly, light gray with a blue tint.....	70.0	71.5
Clay, very silty, light gray with a blue tint; contains some sand from 72 to 73 ft.....	71.5	73.0
Silt, very clayey to slightly sandy, light gray with a blue tint; contains a trace of sand and gravel; moderately calcareous below 74.5 ft.....	73.0	76.0
Silt, moderately clayey, yellowish brown.....	76.0	80.0
Clay, very silty, light brown; light brownish gray from 81 to 81.5 ft; medium brown from 81.5 to 83 ft.....	80.0	86.5
Silt, moderately clayey, light yellowish gray.....	86.5	88.0
Silt, very sandy, light yellowish gray; contains fine to coarse sand.....	88.0	88.5
Silt, very clayey, light brownish gray.....	88.5	90.0
Silt, moderately clayey, light brown with a yellow tint; contains embedded fine to medium sand below 91.5 ft.....	90.0	94.0
Sand, slightly silty, principally quartz, light brown; texture of sand grades from fine to medium with a trace of very fine and coarse to very coarse sand.....	94.0	95.0
Sand, quartz with some pink silicates, texture grades from fine to very coarse sand with a trace of fine gravel; contains about 70 percent medium to coarse sand.....	95.0	96.0
Clay, very silty, light yellowish gray; grades to moderately sandy in lower part; contains very fine to medium sand.....	96.0	98.5
Silt, moderately clayey to moderately sandy, medium yellowish gray; contains very fine to medium sand.	98.5	101.0
Silt, slightly clayey to very sandy, light brown with a yellow tint; contains very fine to medium sand; yellowish brown below 103 ft, and slightly more sand.....	101.0	104.5
Sand, quartz with some pink silicates; texture grades from fine to very coarse sand with a trace of fine gravel.....	104.5	106.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Carlile Formation:		
Shale, medium to dark gray, clayey, very calcareous.	106.0	110.0

Test Hole #09-A-64
(A27-6-31abba)
Dixon County

Location: NE NW NW NE sec. 31, T. 27 N., R. 6 E., approximately 57 feet south and 2,286 feet west of northeast corner.
 Ground elevation: 1,545.0 ft. (t). (Wakefield 7.5 min. quadrangle).
 Depth to water: 49.9 ft. (9-4-64).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Soil, silty, dark gray.....	0.0	0.5
Silt, slightly clayey, dark grayish brown; brown from 1.5 to 2.5 ft; yellowish brown below 2.5 ft..	0.5	5.0
Silt, slightly clayey, moderately calcareous, light yellowish brown with some light gray; some carbonaceous material and limy nodes.....	5.0	10.0
Silt, slightly clayey, moderately calcareous, light olive brown; carbonaceous material and limy nodes; mottled gray with olive brown below from 12 to 12.8 ft.....	10.0	12.8
Silt, slightly clayey, very calcareous, gray; some limy nodes; mottled gray with olive brown below 15 ft.....	12.8	25.3
Silt, slightly clayey, moderately calcareous, light olive brown; some limonite stain; slightly calcareous, mottled gray with grayish brown below 44 ft.	25.3	45.0
Silt, slightly clayey, mottled light gray with yellowish gray.....	45.0	48.2
Silt, moderately clayey, dark grayish brown.....	48.2	50.0
Silt, moderately clayey, dark yellowish brown; brown from 52 to 53.5 ft; mottled brown with yellowish brown below 53.5 ft.....	50.0	56.5
Silt, moderately clayey, mottled yellowish brown with gray; light olive gray from 58 to 60 ft; light brownish gray with limonitic stain below 60 ft.....	56.5	70.0
Silt, slightly clayey, grayish brown; moderately clayey, gray and olive gray below 80 ft.....	70.0	88.0
Silt, moderately clayey, brown; limonitic stain; light brownish gray from 90 to 93 ft; pale brown below 93 ft.....	88.0	95.0
Clay, silty, brown; some limonitic stain; light gray from 99 to 100 ft; light brownish gray with some carbonaceous material below 100 ft.....	95.0	104.6
Clay, silty, carbonaceous, brown; light brownish gray below 106.5 ft.....	104.6	115.0
Silt, very clayey, very calcareous, brown; limy nodes; marly below 116.3 ft.....	115.0	116.6

Silt, clayey, slightly calcareous, light brownish gray; light gray from 117 to 117.5 ft; mottled light gray and light brownish gray below 117.5 ft; noncalcareous below 118.5 ft.....	116.6	120.0
Silt, very clayey, slightly calcareous, carbonaceous, light olive gray; light gray to pale yellow from 122.5 to 123 ft; light gray below 123 ft.....	120.0	124.0
Silt, very clayey, moderately calcareous, light gray to grayish brown.....	124.0	125.0
Till: clay, silty, sandy, moderately calcareous, light brownish gray to light yellowish brown; limy grains; light gray to olive yellow below 129 ft...	125.0	130.0
Till: clay, silty, sandy, gravelly, moderately calcareous, olive brown to yellowish brown and grayish brown.....	130.0	150.0
Till: clay, silty, sandy, gravelly, some pebbles, moderately calcareous, light brownish gray to yellowish gray and pale yellow.....	150.0	164.8
Till: clay, silty, sandy, gravelly, moderately calcareous, olive yellow to brownish gray.....	164.8	179.8
Till: clay, silty, sandy, gravelly, moderately calcareous, very dark gray to dark gray.....	179.8	186.0
Till: clay, silty, sandy, slightly calcareous, olive yellow to olive brown.....	186.0	188.8
Sand, clayey, slightly silty.....	188.8	190.0
Sand, gravelly; fine sand to fine gravel; fine sand to medium gravel below 195 ft.....	190.0	215.0
Gravel, sandy; medium sand to medium gravel.....	215.0	217.0
Silt, moderately clayey, brown with grayish brown...	217.0	222.5
Silt, moderately clayey, grayish brown; light brownish gray from 225 to 230 ft.....	222.5	245.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Carlile Formation:		
Clay, varicolored (light gray, olive, and greenish gray); contains limy chips.....	245.0	251.0
Shale, medium to dark gray with some olive yellow mottling, greasy appearance.....	251.0	255.0
Shale, dark bluish gray, clayey, greasy appearance..	255.0	270.0
Shale, dark olive gray and dark gray, clayey, greasy appearance.....	270.0	280.0

Test Hole #10-A-64
(A27-6-33baaa)
Dixon County

Location: NE NE NE NW sec. 33, T. 27 N., R. 6 E., approximately 15 feet south and 2,453 feet east of northwest corner.

Ground elevation: 1,418.0 ft. (t). (Emerson 7.5 min. quadrangle).

Depth to water: 7.05 ft. (9-4-64).

Depth, in feet
From To

Quaternary System, undifferentiated:

Road fill; black clay.....	0.0	5.0
Silt, moderately clayey, very dark gray.....	5.0	7.2
Silt, moderately clayey, slightly calcareous, olive gray.....	7.2	14.4
Silt, moderately clayey, very dark gray; slightly calcareous below 20 ft.....	14.4	27.2
Silt, moderately clayey, slightly calcareous, black.	27.2	29.0
Silt, moderately clayey, moderately calcareous, carbonaceous, very dark grayish brown.....	29.0	40.0
Sand, very fine to medium; contains carbonaceous material.....	40.0	42.5
Silt, moderately sandy, slightly clayey, carbonaceous, very dark grayish brown; shells; dark gray below 45 ft.....	42.5	52.4
Gravel, pebbly, much limestone gravel.....	52.4	55.0
Silt, slightly clayey, grayish brown; light brownish gray below 57 ft.....	55.0	63.5
Sand, very fine to fine.....	63.5	65.0
Sand, gravelly; fine sand to fine gravel.....	65.0	72.0
Silt, slightly clayey, light bluish gray.....	72.0	74.0
Sand, fine to medium, some coarse; fine to coarse, some very coarse with trace of fine gravel below 75 ft.....	74.0	78.3
Silt, very clayey, light bluish green; pale olive from 78.5 to 79.4 ft; mottled dark gray to light brown below 79.4 ft.....	78.3	80.0
Silt, very clayey, grayish brown; moderately calcareous below 83 ft; light brownish gray from 83.3 to 84 ft.....	80.0	84.0
Silt, moderately clayey, moderately calcareous, grayish brown; pale brown from 85 to 86 ft; slightly calcareous, brownish gray below 86 ft....	84.0	88.5
Silt, moderately clayey, brown; gray below 92 ft; slightly calcareous below 95 ft.....	88.5	97.5
Silt, moderately clayey, grayish brown; brownish gray below 99 ft.....	97.5	103.0
Silt, very clayey, medium gray; pinkish brown from 105.5 to 108 ft; brown below 108 ft.....	103.0	110.2

Cretaceous System - Upper Cretaceous Series - Colorado Group:

Carlile Formation:

Clay, light gray mottled with yellow, clayey, greasy	110.2	115.0
Clay, olive gray, greasy.....	115.0	123.3
Shale, dark gray, clayey, greasy.....	123.3	140.0

Test Hole #22-A-52
(A28-4-1aabb)
Dixon County

Location: NW NW NE NE sec. 1, T. 28 N., R. 4 E., approximately 5 feet south and 1,263 feet west of northeast corner.
 Ground elevation: 1,465.0 ft. (t). (Concord 7.5 min. quadrangle).
 Depth to water: Unknown (9-4-52).

Depth, in feet
 From To

Quaternary System, undifferentiated:

Road fill and soil, silt, slightly clayey, dark brownish gray.....	0.0	1.0
Silt, slightly clayey, medium yellowish gray; moderately clayey from 3 to 5 ft; slightly lighter in color below 3 ft; contains a few limy nodules below 5 ft.....	1.0	10.0
Silt, very slightly clayey, moderately calcareous, medium yellowish gray with a trace of mottled yellowish brown; light yellowish gray below 30 ft; mottled light gray below 40 ft; contains embedded sand below 60 ft.....	10.0	70.0
Silt, moderately clayey, moderately calcareous, very light yellowish gray with some mottled light gray and yellowish brown.....	70.0	75.0
Silt, very clayey, light yellowish gray with some mottled light gray and yellowish brown; contains embedded fine to medium sand.....	75.0	77.5
Sand and some gravel, quartz with pink silicates; texture grades from fine sand to fine gravel; many dark stained grains.....	77.5	80.0
Sand, quartz with pink silicates; texture grades from fine to very coarse sand with a trace of fine gravel; slightly finer texture below 120 ft..	80.0	130.0
Sand, quartz with pink silicates; texture grades from fine to coarse; slightly silty from 131 to 133 ft.....	130.0	145.0
Test hole abandoned because of excessive drilling fluid loss.		

**Test Hole #23-A-52
(28-5-3abbb)
Dixon County**

Location: NE NW NW NW sec. 3, T. 28 N., R. 5 E., approximately 8 feet south and 2,540 feet west of northeast corner.

Ground elevation: 1,484.0 ft. (t). (Allen 7.5 min. quadrangle).

Depth to water: 46.0 ft. (9-11-52).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Road fill and soil, silt, moderately clayey, dark brownish gray.....	0.0	1.0
Silt, very clayey, medium yellowish gray.....	1.0	1.5
Silt, slightly to moderately clayey, moderately calcareous, medium yellowish gray; slightly clayey below 5 ft; has some mottled yellowish brown.....	1.5	12.0
Silt, slightly clayey, moderately calcareous, light brownish gray; contains some iron-manganese concretions and rootlets; light yellowish gray from 20 to 22 ft; medium yellowish gray below 22 ft....	12.0	30.0
Silt, slightly clayey, moderately calcareous, medium brownish gray; medium brownish yellow from 33 to 35 ft; no sample obtained from 35 to 38 ft.....	30.0	38.0
Silt, very slightly clayey, moderately calcareous, medium brownish yellow; contains a trace of very fine to medium sand below 45 ft.....	38.0	49.0
Clay, slightly silty, moderately calcareous, light to medium brownish gray; slightly sandy with a trace of gravel from 49 to 50 ft, and from 55 to 56 ft.....	49.0	56.0
Till: clay, moderately silty to slightly sandy, moderately calcareous, light and medium yellowish gray with some mottled brownish yellow; contains sand with some gravel and pebbles; medium gray from 67.5 to 69 ft; medium brownish gray below 70 ft; contains sand and gravel layers from 67 to 67.5 ft, and from 73.5 to 74.5 ft; moderately to very sandy below 74.5 ft.....	56.0	76.0
Till: clay, moderately silty to slightly sandy, moderately calcareous, medium gray; contains some mottled yellow and brown from 76 to 80.5 ft; slightly silty from 112.5 to 114.8 ft; medium brownish gray, moderately silty to very sandy below 114.8 ft; medium yellowish gray.....	76.0	115.0
Sand, texture grades from fine to coarse; much medium sand, occasional thin silt layers; texture grades from fine to very coarse below 140 ft.....	115.0	145.0

Sand and some gravel, quartz with pink silicates; texture grades from fine sand to fine gravel; contains about 10 percent gravel; contains silt layers from 157 to 157.3 ft, and from 159.5 to 159.7 ft.....	145.0	160.0
Sand and some gravel, quartz with pink silicates; texture grades from fine sand to fine gravel; contains about 25 percent gravel; contains silt layer from 164 to 164.3 ft.....	160.0	167.5
Silt, slightly clayey to moderately sandy, light yellowish gray; contains fine to coarse sand.....	167.5	169.0
Sand, texture grades from fine to very coarse with a trace of fine gravel.....	169.0	171.0
Silt, very sandy, to sand, very silty; contains very fine to medium sand.....	171.0	171.5
Clay, slightly silty, medium gray.....	171.5	172.5
Sand, quartz with some pink and light green silicates; texture grades from fine to very coarse with a trace of fine gravel.....	172.5	175.0
Sand and some gravel, texture grades from medium sand to fine gravel; contains about 10 to 15 percent gravel; contains some medium gravel from 185 to 190 ft.....	175.0	199.0
Silt, slightly clayey, light yellowish gray.....	199.0	199.8
Sand, texture grades from fine to very coarse with a trace of fine gravel.....	199.8	218.5
Silt, moderately clayey, medium brownish gray; very clayey from 220 to 222 ft; slightly darker in color, light brownish gray from 222 to 223 ft.....	218.5	223.0
Silt, slightly clayey to slightly sandy, medium yellowish gray; contains very fine sand.....	223.0	224.0
Sand and some gravel, texture grades from medium sand to fine gravel; contains a few silt layers...	224.0	230.0
Sand, texture grades from medium to very coarse; contains a trace of fine gravel; slightly coarser texture below 240 ft; in part slightly silty below 245 ft.....	230.0	255.2
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Carlile Formation:		
Shale, medium brownish yellow, clayey.....	255.2	255.5
Shale, dark gray, clayey, slightly calcareous.....	255.5	280.0

Test Hole #24-A-52
(A28-5-6bbaa)
Dixon County

Location: NE NE NW NW sec. 6, T. 28 N., R. 5 E., approximately 25 feet south and 2,600 feet east of northwest corner.
 Ground elevation: 1,416.0 ft. (t). (Concord 7.5 min. quadrangle).
 Depth to water: 66.1 ft. (9-11-52).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Soil, silt, slightly clayey, dark brownish gray.....	0.0	1.0
Silt, moderately clayey, medium brownish gray; medium brown below 1.5 ft.....	1.0	2.5
Silt, slightly clayey, medium brownish yellow; slightly to moderately calcareous below 5 ft; slightly less clayey, medium yellowish gray below 10 ft.....	2.5	15.0
Silt, coarse textured, moderately calcareous, medium yellowish gray; some mottled gray below 20 ft; very clayey from 32 to 32.2 ft.....	15.0	35.5
Silt, very clayey, moderately calcareous, medium yellowish gray.....	35.5	36.0
Silt, slightly to moderately clayey, moderately cal- careous, medium yellowish gray; moderately to very clayey from 39.5 to 45 ft, and from 46.5 to 50 ft.	36.0	57.5
Silt, slightly clayey to moderately sandy, moder- ately calcareous, medium yellowish gray; contains fine to medium sand.....	57.5	60.0
Silt, moderately to very sandy, slightly calcareous, medium yellowish gray; contains fine to medium with a trace of coarse sand; slightly clayey to very sandy from 63 to 65 ft; slightly clayey to moderately sandy; moderately calcareous below 65 ft.....	60.0	67.5
Sand, slightly silty, slightly calcareous; texture of sand grades from fine to very coarse; contains a trace of fine gravel.....	67.5	70.0
Sand and gravel: quartz, pink and dark silicates and limy grains; texture grades from fine sand to coarse gravel.....	70.0	81.0
Sand and gravel: quartz with pink silicates; texture grades from fine sand to medium gravel.....	81.0	91.2
Silt, moderately sandy, light yellowish gray; con- tains fine to medium sand.....	91.2	92.0
Sand and some gravel, quartz with pink silicates; texture grades from fine sand to fine gravel.....	92.0	93.8
Silt, moderately to very sandy, light and medium yellowish gray; contains very fine to medium sand.	93.8	98.0

Sand, quartz and pink silicates; texture grades from fine to coarse; contains very coarse sand from 98 to 100.8 ft.....	98.0	105.0
Sand and some gravel: texture grades from medium sand to fine gravel; contains a trace of medium gravel; contains interbedded silt layers from 105 to 110 ft; silt layer from 118.2 to 118.8 ft..	105.0	118.8
Sand, texture grades from fine to very coarse with a trace of fine gravel; texture grades from fine to coarse with some very coarse sand below 140 ft....	118.8	150.0
Sand, texture grades from fine to coarse with some very coarse sand; some clayey silt layers.....	150.0	155.0
Sand, texture grades from fine to coarse with some very coarse sand; some clayey silt layers.....	155.0	161.5
Silt, moderately to very clayey, light yellowish gray.....	161.5	163.0
Sand and gravel: texture grades from medium sand to fine gravel; contains some medium gravel, slightly coarser below 175 ft.....	163.0	179.0
Clay, slightly to moderately silty, light brown to light gray.....	179.0	183.5
Sand, texture grades from fine to very coarse with a trace of fine gravel.....	183.5	185.0
Sand and gravel, texture grades from fine sand to fine gravel; texture grades from medium sand to medium gravel below 190 ft.....	185.0	191.5
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Carlile Formation:		
Shale, dark gray, clayey, slightly calcareous; clay stone layers from 193.8 to 194 ft, and 202.9 to 203.3 ft; moderately calcareous; contains finely disseminated pyrite.....	191.5	210.0

**Test Hole #25-A-52
(A28-5-23bbbb)
Dixon County**

Location: NW NW NW NW sec. 23, T. 28 N., R. 5 E., approximately 103 feet south and 10 feet east of northwest corner.

Ground elevation: 1,524.0 ft. (t). (Allen 7.5 min. quadrangle).

Depth to water: 27.0 ft. (9-11-52).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Road fill and soil, silt, slightly clayey, slightly calcareous, medium brownish gray.....	0.0	1.0
Silt, slightly clayey, medium yellowish gray; slightly to moderately clayey from 3 to 4 ft; slightly calcareous from 5 to 10 ft; contains some limy nodules.....	1.0	10.0
Silt, very slightly clayey, moderately calcareous, medium yellowish gray; light yellowish gray with some mottled light gray below 19 ft.....	10.0	25.0
Silt, moderately clayey, moderately calcareous, light brownish gray; light yellowish gray from 28.5 to 35 ft; medium brownish yellow from 35 to 37.5 ft; medium yellowish gray from 40 to 44 ft; slightly less clayey, slightly calcareous below 45 ft.....	25.0	49.5
Silt, very clayey, slightly calcareous, light brownish gray; contains some gravel.....	49.5	51.2
Clay, slightly to moderately silty, medium yellowish gray; light gray below 53 ft; slightly calcareous from 55 to 59.5 ft. and 61 to 65 ft; contains a trace of limy nodules from 65 to 67.5 ft; very silty below 69 ft.....	51.2	70.0
Silt, moderately clayey, light gray; slightly clayey below 71 ft; granular structure.....	70.0	74.5
Clay, slightly silty, light gray; contains a few limy nodules; light brown from 76.5 to 79 ft; contains many limy nodules; moderately silty below 78 ft; slightly sandy below 79 ft.....	74.5	80.0
Sand and gravel: interbedded with clay, slightly calcareous.....	80.0	80.6
Clay, slightly silty to slightly sandy, moderately calcareous, light yellowish gray, possibly till; contains sand with a trace of gravel; light gray from 80.6 to 81 ft; light brownish gray below 85 ft.....	80.6	86.2
Sand, moderately silty, slightly calcareous, iron-stained; texture of sand grades from fine to medium.....	86.2	86.5

Clay, slightly silty, slightly calcareous, light brownish gray.....	86.5	90.0
Clay, slightly silty, light gray; contains a trace of limy nodules; medium gray below 93 ft.....	90.0	94.7
Till: clay, slightly silty to very slightly sandy, slightly calcareous, very light yellowish gray; contains limy nodules and white limy areas.....	94.7	95.6
Till: clay, moderately silty to slightly sandy, moderately calcareous, light yellowish gray.....	95.6	108.0
Silt, slightly clayey to moderately sandy, slightly calcareous, light yellowish gray; contains fine to medium sand.....	108.0	110.0
Silt, slightly clayey to very sandy, light yellowish gray; contains fine to medium sand, nonclayey below 112 ft.....	110.0	112.8
Sand, very silty; texture of sand grades from fine to medium.....	112.8	115.0
Sand, very silty, interbedded with silt, slightly clayey to very sandy, light yellowish gray; texture of sand grades from very fine to fine.....	115.0	120.0
Silt, slightly clayey to moderately sandy, light yellowish gray; contains very fine with a trace of fine sand.....	120.0	122.0
Silt, slightly clayey and moderately to very sandy, slightly calcareous, light yellowish gray; contains very fine with some fine sand.....	122.0	125.0
Marl, white.....	125.0	125.8
Silt, slightly clayey to moderately sandy, moderately calcareous, light yellowish gray; contains very fine to fine with a trace of medium sand.....	125.8	128.7
Sand and gravel; in part silty, quartz with pink and yellow silicates, moderately calcareous; texture grades from medium sand to fine gravel.....	128.7	130.0
Sand and gravel; quartz with pink and yellow silicates; texture grades from medium sand to fine gravel; contains some medium gravel, about 25 percent gravel from 130 to 140 ft, 40 percent from 140 to 145 ft, and 60 to 70 percent below 145 ft..	130.0	153.0
Silt, moderately to very clayey, very light gray; contains a trace of embedded sand and scattered white limy areas; slightly sandy and light yellowish gray below 155 ft.....	153.0	157.0
Silt, slightly clayey, medium brown; coarse texture to slightly sandy; contains very fine sand.....	157.0	160.0
Silt, moderately clayey to moderately sandy, medium brown; contains very fine to fine sand.....	160.0	161.0
Clay, very silty, medium brown; light brown below 160 ft; contains some white limy areas.....	161.0	165.0
Silt, moderately calcareous, light yellowish gray; contains a few limy nodules.....	165.0	169.0

Silt, moderately to very clayey, light brown; contains limy nodules from 169 to 170 ft.....	169.0	172.5
Clay, very silty, light and medium brown; slightly sandy from 176 to 178.7 ft; moderately to very sandy below 178.7 ft; contains medium to coarse sand; slightly calcareous below 178.7 ft.....	172.5	180.0
Silt, slightly clayey to very sandy, light yellowish gray; contains medium to very coarse sand.....	180.0	181.5
Sand, texture grades from medium to very coarse sand; contains a trace of fine gravel; very silty from 181.5 to 184.5 ft; in part silty below 184.5 ft.....	181.5	185.8
Silt, slightly clayey to very sandy, light yellowish gray; contains medium to coarse sand.....	185.8	190.0
Silt, very clayey to slightly sandy, interbedded with silt; slightly clayey to very sandy, light yellowish gray.....	190.0	195.0
Sand, slightly to moderately silty; texture of sand grades from medium to coarse.....	195.0	198.8
Clay, slightly sandy, medium brown; contains fine to medium sand.....	198.8	201.2
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Carlile Formation:		
Shale, mottled light brownish gray, medium brownish gray, medium yellowish gray and yellowish brown, clayey, some mottled dark gray below 217.5 ft; contains ironstone layer from 203 to 203.2 ft; very calcareous.....	201.2	219.0
Shale, medium to dark gray, clayey, slightly calcareous below 220 ft; contains a thin bentonite layer in interval from 229.5 to 230 ft.....	219.0	230.0

Test Hole #26-A-52
(A28-5-35cdcc)
Dixon County

Location: SW SW SE SW sec. 35, T. 28 N., R. 5 E., approximately 10 feet north and 1,460 feet east of southwest corner.
 Ground elevation: 1,550.0 ft. (t). (Wakefield 7.5 min. quadrangle).
 Depth to water: 49.4 ft. (9-25-52).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Soil and road fill, silt, slightly to moderately clayey, slightly calcareous, medium yellowish gray	0.0	1.0
Silt, very slightly clayey, moderately calcareous, light yellowish gray; contains a few limy nodules below 5.0 ft.....	1.0	16.5
Silt, slightly clayey, moderately calcareous, light yellowish gray with some mottled yellowish brown and light gray.....	16.5	33.5
Silt, slightly clayey, light brownish yellow and light yellowish gray.....	33.5	40.3
Silt, slightly to moderately clayey, medium brownish gray.....	40.3	41.8
Silt, moderately clayey, medium brown; slightly lighter in color below 42.5 ft.....	41.8	43.0
Silt, very clayey, to clay, very silty, medium brown	43.0	44.0
Clay, slightly to moderately silty, medium brown....	44.0	47.0
Clay, very silty, to silt, very clayey, medium yellowish brown; medium brown below 51 ft.....	47.0	55.0
Silt, moderately to very clayey, medium yellowish gray.....	55.0	61.0
Silt, very clayey, medium brown.....	61.0	65.0
Silt, moderately clayey, medium yellowish gray.....	65.0	68.5
Silt, very clayey, medium brown.....	68.5	76.0
Clay, moderately to very silty, medium brown.....	76.0	81.0
Clay, slightly to moderately silty, medium brown; slightly silty from 84.5 to 87 ft, and below 90 ft; light brownish gray below 94 ft.....	81.0	94.7
Clay, slightly silty, medium brownish gray; contains a trace of embedded sand below 95 ft; light brownish gray from 95 to 98 ft; light brown below 98 ft	94.7	100.0
Clay, slightly to moderately silty, slightly sandy, light brown; contains fine to very coarse sand....	100.0	104.0
Till: clay, moderately silty to moderately sandy, moderately calcareous, light yellowish gray; contains fine to very coarse sand; light brown below 105 ft.....	104.0	106.0
Sand and gravel, heterogeneous composition, slightly calcareous.....	106.0	106.6

Till: clay, slightly silty to slightly sandy, moderately calcareous, light and medium yellowish gray; contains sand and a trace of gravel; contains silt layer; coarse texture; a few limy nodules from 109.5 to 110 ft.....	106.6	115.2
Clay, slightly silty, moderately calcareous, medium brownish gray; contains a trace of embedded sand, (possibly till).....	115.2	117.0
Clay, slightly silty, moderately calcareous, medium gray; medium brown below 117.5 ft; contains a trace of embedded sand below 120 ft.....	117.0	125.0
Till: clay, slightly silty to slightly sandy, moderately calcareous, light yellowish gray; medium brownish gray below 135 ft; in part very sandy to gravelly from 138.5 to 140 ft.....	125.0	142.0
Clay, slightly silty, light brownish gray, moderately silty; medium brown below 148.5 ft.....	142.0	153.0
Silt, moderately to very clayey, medium yellowish gray.....	153.0	155.5
Silt, very clayey, medium brownish gray; medium brown below 160 ft.....	155.5	167.0
Silt, very clayey, to clay, very silty, slightly calcareous, light brown; contains a trace of embedded sand; contains limy nodules below 170 ft...	167.0	173.0
Clay, moderately silty to slightly sandy, moderately calcareous, light brown.....	173.0	174.5
Clay, moderately silty to very sandy, light brown...	174.5	175.0
Sand, moderately clayey, light yellowish gray; texture of sand grades from fine to medium.....	175.0	176.5
Clay, moderately silty to moderately sandy, light yellowish gray; contains fine to medium sand.....	176.5	190.5
Clay, very sandy, to sand, very clayey, light yellowish gray; texture of sand grades from very fine to medium.....	190.5	201.0
Clay, very sandy, medium brownish yellow; contains fine to medium sand.....	201.0	205.5
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Carlile Formation:		
Shale, light yellowish gray with a little brownish yellow, very clayey.....	205.5	209.0
Shale, medium to dark gray, very clayey, slightly calcareous below 210.5 ft; some mottled brownish yellow.....	209.0	211.5
Limestone, contains much aragonite.....	211.5	212.5
Shale, medium to dark gray, very clayey, slightly calcareous.....	212.5	220.0

Test Hole #20-A-52
(A29-4-31cccb)
Dixon County

Location: NW SW SW SW sec. 31, T. 29 N., R. 4 E., approximately 627 feet north and 9 feet east of southwest corner.
 Ground elevation: 1,530.0 ft. (t). (Laurel 7.5 min. quadrangle).
 Depth to water: 67.3 ft. (8-28-52).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Road fill and soil.....	0.0	1.0
Silt, slightly clayey, moderately calcareous, medium yellowish gray; contains many limy nodules.....	1.0	1.3
Silt, slightly clayey, moderately calcareous, medium yellowish gray; texture of silt grades from fine to coarse; contains a few limy nodules; slightly sandy below 4 ft; contains very fine to fine sand.	1.3	20.0
Silt, slightly to moderately clayey, moderately calcareous, light yellowish gray; contains some mottled brown and yellow from 25 to 31.5 ft; medium yellowish gray below 35 ft; slight brown tint below 50 ft.....	20.0	53.8
Silt, slightly to moderately clayey, moderately calcareous, medium brownish gray.....	53.8	57.0
Silt, slightly to moderately clayey, moderately calcareous, medium brownish yellow; medium yellowish gray below 62.5 ft; slightly calcareous below 68 ft.....	57.0	69.0
Silt, slightly to moderately clayey, medium gray with some mottled brownish yellow; contains some shell fragments.....	69.0	70.0
Silt, moderately to very clayey, medium brown.....	70.0	71.0
Silt, moderately to very clayey, dark gray with some mottled brownish yellow; slight brown tint below 74 ft.....	71.0	75.5
Silt, very clayey, medium yellowish gray with a brown tint; moderately clayey below 77 ft; light yellowish gray with a brown tint.....	75.5	81.5
Silt, moderately clayey, medium brown; very clayey below 84 ft; light brown below 87.5 ft.....	81.5	88.5
Silt, moderately clayey, slightly to moderately calcareous, light yellowish gray; contains a few limy nodules; light brown from 91 to 93.5 ft.....	88.5	95.5
Clay, very silty, slightly calcareous, medium brown.	95.5	97.5
Silt, moderately clayey, slightly calcareous, light brown.....	97.5	99.3
Clay, very silty, to silt, very clayey, slightly to moderately calcareous, medium brown.....	99.3	102.5

Clay, moderately silty, slightly calcareous, light brownish gray and light brown; contains a few limy nodules.....	102.5	115.0
Clay, very silty, moderately calcareous, light brown; contains limy nodular layer at 117 ft.....	115.0	118.0
Silt, very clayey to slightly sandy, slightly calcareous; contains sand and pebbles.....	118.0	120.0
Silt, moderately clayey to very slightly sandy, slightly calcareous, medium brown; contains very fine to fine sand with a few limy nodules.....	120.0	124.0
Silt, slightly clayey, medium brown.....	124.0	125.0
Silt, slightly clayey to slightly sandy, moderately calcareous, medium brown; contains very fine to medium sand.....	125.0	126.0
Silt, slightly clayey, dark brownish gray.....	126.0	127.3
Silt, very clayey, light gray.....	127.3	128.5
Silt, moderately clayey and slightly to in part very sandy, slightly calcareous, light gray; contains fine to medium sand.....	128.5	129.4
Silt, moderately to very clayey and slightly sandy, moderately calcareous, light gray; contains fine to medium sand.....	129.4	130.2
Sand, very silty; texture of sand grades from very fine to fine; contains two thin silt layers.....	130.2	132.5
Silt, moderately clayey, moderately calcareous, light gray.....	132.5	133.1
Sand and gravel; heterogeneous composition; texture grades from coarse sand to coarse gravel.....	133.1	134.0
Silt, very clayey, light and medium gray.....	134.0	135.0
Clay, slightly silty, medium brown; contains a few small limy nodules; very light brown below 137.8 ft; contains embedded fine to medium sand.....	135.0	138.2
Till: clay, moderately silty to slightly sandy, moderately calcareous, medium gray.....	138.2	145.0
Clay, slightly silty, moderately calcareous, medium gray; contains a few limy nodules.....	145.0	147.2
Till: clay, moderately silty to slightly sandy, moderately calcareous, medium gray; contains fine to medium sand.....	147.2	150.8
Silt, very sandy, moderately calcareous, light gray; contains very fine to medium with a trace of coarse sand.....	150.8	151.3
Clay, slightly silty, moderately calcareous, medium gray.....	151.3	152.8
Till: clay, moderately silty to slightly sandy, moderately calcareous, medium gray; contains fine to medium sand; contains a trace of gravel and pebbles below 160 ft; slightly lighter in color below 167 ft.....	152.8	174.8

Sand and gravel; quartz with pink and green silicates, slightly calcareous; texture grades from medium sand to coarse gravel to 183.2 ft, and from fine sand to medium gravel from 183.2 to 192 ft; contains many limestone grains from 174.8 to 183.2 ft; contains clay layers from 176.5 to 178 ft, and from 190.9 to 191.1 ft.....	174.8	192.0
Clay, light pinkish gray; contains a few limy nodules.....	192.0	197.5
Clay, medium gray; contains a few limy nodules; slightly calcareous and medium brownish gray below 203 ft.....	197.5	205.0
Clay, moderately silty, very calcareous, very light gray.....	205.0	206.5
Clay, moderately to very silty, moderately calcareous, medium brownish gray; contains a trace of embedded sand and chalk fragments.....	206.5	214.8
Sand, composed of chalk fragments; texture grades from fine to coarse.....	214.8	216.8
Silt, moderately clayey to moderately sandy, very calcareous, medium gray; contains chalk fragments.	216.8	222.8
Silt, interbedded with sand and gravel, sand and gravel composed of limestone and chalk fragments..	222.8	225.5
Silt, slightly clayey to very sandy, very calcareous, medium gray; contains fine to coarse sand with a few limestone and ironstone fragments; non-calcareous below 230 ft.....	225.5	230.5
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Carlile Formation:		
Shale, medium to dark gray, very clayey.....	230.5	240.0

Test Hole #21-A-52
(A29-4-34cccc)
Dixon County

Location: SW SW SW SW sec. 34, T. 29 N., R. 4 E., approximately 6 feet north and 110 feet east of southwest corner.

Ground elevation: 1,597.0 ft. (t). (Concord 7.5 min. quadrangle).

Depth to water: 21.9 ft. (8-28-52).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Soil, sand, very silty, dark gray; texture of sand grades from fine to medium with some coarse sand..	0.0	2.3
Sand, very slightly silty, quartz; texture grades from fine to medium with a trace of coarse sand; iron-stained.....	2.3	18.0
Silt, very slightly clayey, slightly calcareous, medium yellowish gray.....	18.0	20.0
Silt, slightly clayey, moderately calcareous, medium yellowish gray; contains many limonitic rootlets and nodules from 20 to 25 ft.....	20.0	38.0
Silt, very slightly clayey, moderately calcareous, medium gray; contains bluish green tint from 38 to 45 ft; contains a few wood fragments and snails below 45 ft.....	38.0	58.0
Silt, slightly clayey, moderately calcareous, medium gray.....	58.0	68.8
Sand, quartz; texture grades from fine to medium with some coarse sand.....	68.8	70.5
Silt, moderately clayey, moderately calcareous, medium gray with a blue tint; fine textured.....	70.5	74.0
Silt, very clayey, moderately calcareous, light gray	74.0	77.0
Silt, moderately clayey, moderately calcareous, medium gray; slightly calcareous from 77 to 80 ft, and below 90 ft; non-calcareous from 80 to 82.5 ft; light gray below 82.5 ft; contains some limy nodules below 85 ft.....	77.0	97.5
Silt, moderately clayey, medium olive gray; contains a few embedded sand grains; slightly calcareous below 98.5 ft; medium yellowish gray.....	97.5	101.5
Till: clay, very silty to slightly sandy, moderately calcareous, light yellowish gray; contains sand with a trace of gravel and pebbles; very calcareous from 102 to 110 ft.....	101.5	124.5
Clay, moderately silty, moderately calcareous, medium brownish gray; contains a trace of embedded sand; slightly calcareous from 124.5 to 125 ft....	124.5	128.0

Till: clay, moderately silty to slightly sandy, moderately calcareous, light yellowish gray with a brown tint; contains ironstone boulder at 128.5 ft.....	128.0	138.4
Silt, slightly clayey to very sandy, slightly calcareous, medium yellowish gray; contains fine to coarse sand; light yellowish gray and moderately calcareous below 140 ft; contains some fine gravel	138.4	144.0
Till: clay, moderately silty to slightly sandy, moderately calcareous, light yellowish gray; contains fine to coarse sand.....	144.0	155.0
Till: clay, moderately silty to moderately sandy, moderately calcareous, medium brownish yellow; contains sand and gravel.....	155.0	156.5
Till: clay, moderately silty to slightly sandy, moderately calcareous, medium gray; contains fine to coarse sand.....	156.5	160.5
Till: clay, slightly silty to very slightly sandy, slightly calcareous, medium brownish gray; medium yellowish gray from 163.5 to 165 ft; medium olive gray from 165 to 167 ft; light gray with a yellow tint below 167 ft; slightly more silt below 165 ft	160.5	170.0
Till: clay, moderately silty to slightly sandy, moderately calcareous, light gray; contains fine to coarse sand with occasional gravel and pebble grains; medium gray below 173 ft; moderately sandy from 175 to 178 ft.....	170.0	222.5
Sand, slightly to moderately silty, slightly calcareous; texture of sand grades from very fine to medium; slightly cemented.....	222.5	225.0
Sand, quartz with some pink silicates; texture grades from fine to coarse with a trace of very coarse sand and fine gravel; thin silt layers at 229 and 234 ft.....	225.0	240.0
Sand, quartz with pink silicates; texture grades from fine to very coarse with a trace of fine gravel.....	240.0	271.5
Silt, slightly sandy, slightly calcareous, medium yellowish gray, brownish tint; contains very fine sand.....	271.5	275.0
Silt, slightly clayey, slightly calcareous, dark gray.....	275.0	280.0
Silt, very slightly clayey, slightly calcareous; coarse texture; slightly to moderately clayey below 290 ft.....	280.0	292.0
Silt, moderately to very clayey, medium gray.....	292.0	313.5
Clay, moderately to very silty, medium gray; light gray below 320 ft; contains a trace of fine to medium sand below 325 ft.....	313.5	330.0
Sand, slightly silty; texture of sand grades from very fine to fine with a trace of medium sand.....	330.0	332.5

Sand, quartz with green and some pink silicates;
 texture grades from fine to coarse with some very
 coarse sand; texture grades from fine to very
 coarse with a trace of fine gravel below 335 ft;
 contains thin clay layers below 340 ft..... 332.5 345.6

Cretaceous System - Upper Cretaceous System - Colorado Group:

Carlile Formation:

Shale, dark gray, very clayey, slightly calcareous;
 moderately calcareous below 350 ft; contains a
 trace of speckled white; contains a thin bentonite
 layer at 353.5 ft..... 345.6 360.0

Test Hole #19-B-64
(A29-5-3ccdd)
Dixon County

Location: SE SE SW SW sec. 3, T. 29 N., R. 5 E., approximately 6 feet north and 1,218 feet east of southwest corner.
 Ground elevation: 1,255.0 ft. (t). (Martinsburg 7.5 min. quadrangle).
 Depth to water: 16.5 ft. (8-21-64).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Road fill.....	0.0	0.5
Silt, slightly clayey, slightly calcareous, dark grayish brown; much carbonaceous material below 3 ft.....	0.5	5.0
Silt, slightly clayey, dark grayish brown; iron stain.....	5.0	9.0
Silt, slightly clayey, gray to light brownish gray; some iron stain; slightly calcareous from 10 to 14 ft, and below 15 ft.....	9.0	18.0
Silt, slightly clayey, olive gray.....	18.0	23.5
Silt, slightly clayey, slightly calcareous, dark gray; some iron stain; moderately calcareous from 24.5 to 27.8 ft.....	23.5	32.0
Silt, slightly clayey, sandy, very calcareous, gray; sand is very fine; limy areas.....	32.0	35.0
Sand, silty; sand is very fine to medium; some snail shells.....	35.0	40.0
Sand, gravelly; very fine sand to medium gravel.....	40.0	51.5
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Carlile Formation:		
Shale, dark gray, clay.....	51.5	60.0
Greenhorn Formation:		
Limestone, dark gray, shaly; contains interbedded gray shale and bentonite seams.....	60.0	70.0
Limestone, gray to dark gray, shaly with interbedded shaly seams; contains Inoceramus.....	70.0	87.7
Graneros Formation:		
Shale, dark gray, limy.....	87.7	91.0

**Test Hole #18-B-64
(A29-5-22cdaa)
Dixon County**

Location: NE NE SE SW sec. 22, T. 29 N., R. 5 E., approximately 1,240 feet north and 2,530 feet east of southwest corner.

Ground elevation: 1,402.0 ft. (t). (Allen 7.5 min. quadrangle).

Depth to water: 88.3 ft. (9-16-64).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Roadfill: no sample.....	0.0	0.6
Silt, slightly clayey, slightly calcareous, light olive brown, iron stain; grayish brown from 1.7 to 5 ft; yellowish brown below 5 ft.....	0.6	11.8
Sand, gravelly; fine sand to medium gravel.....	11.8	40.0
Silt, very clayey, moderately sandy, brown; sand is very fine to medium.....	40.0	44.0
Sand, very fine to very coarse; some very fine to medium gravel below 50 ft.....	44.0	53.0
Silt, very sandy, slightly clayey, light brownish gray; sand is very fine to medium.....	53.0	54.0
Sand, gravelly, silty; fine sand to medium gravel...	54.0	58.0
Silt, very sandy, slightly clayey, light brownish gray; sand is very fine to medium.....	58.0	62.0
Sand, gravelly; very fine sand to medium gravel.....	62.0	98.0
Silt, very clayey, very sandy, light gray to grayish brown; sand is very fine to coarse; some volcanic ash.....	98.0	108.0
Volcanic ash.....	108.0	111.7
Silt, very clayey, light olive gray and gray; some very fine sand; slightly calcareous below 120.5 ft	111.7	130.0
Silt, very clayey, sandy, gray with some olive; sand is very fine to very coarse; some very fine to fine gravel from 133 to 134.5 ft.....	130.0	140.0
Sand, gravelly; fine sand to medium gravel.....	140.0	144.4
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Carlile Formation:		
Shale, dark gray mottled with reddish brown, clayey, weathered.....	144.4	145.0
Shale, dark gray.....	145.0	150.0

**Test Hole #17-B-64
(A29-6-31dadd)
Dixon County**

Location: SE SE NE SE sec. 31, T. 29 N., R. 6 E., approximately 1,570 feet north and 7 feet west of southeast corner.

Ground elevation: 1,485.0 ft. (t). (Allen 7.5 min. quadrangle).

Depth to water: 49.7 ft. (8-24-64).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Silt, slightly clayey, light olive brown; slightly calcareous below 0.5 ft; few limy nodes.....	0.0	3.0
Silt, slightly clayey, very calcareous, light olive brown; limy nodes.....	3.0	16.3
Silt, slightly clayey, very calcareous, grayish brown; some iron stain; dark brown below 30 ft....	16.3	36.5
Silt, slightly clayey, slightly sandy, very calcareous, light yellowish brown; sand is very fine to fine; some iron stain; some gravel grains below 40.95 ft.....	36.5	41.4
Silt, moderately clayey, slightly sandy, brown; some iron stain.....	41.4	44.0
Till: clay, silty, sandy, gravelly, very calcareous, light brownish gray; some pale brown and light brownish gray.....	44.0	90.2
Silt, very clayey, moderately sandy, light gray; sand is very fine to medium.....	90.2	91.0
Till: clay, silty, sandy, gravelly, gray with some yellowish brown, very calcareous; some iron stain; some shale fragments below 99 ft.....	91.0	105.0
Till: clay, silty, sandy, gravelly, olive to gray, very calcareous; some iron stain.....	105.0	110.0
Till: clay, silty, sandy, gravelly, dark gray, very calcareous.....	110.0	138.0
Silt, clayey, sandy, very calcareous, gray; sand is very fine to medium.....	138.0	142.0
Till: clay, silty, sandy, gravelly, very calcareous, gray; dark gray from 145 to 159 ft.....	142.0	185.0
Silt, very clayey, gray, some dark gray; few sand grains.....	185.0	193.7
Silt, very clayey, carbonaceous, dark gray; gray below 195.1 ft; some very fine to fine sand.....	193.7	195.0
Till: clay, silty, sandy, gravelly, moderately calcareous, gray; grayish brown below 201 ft.....	195.0	205.0
Sand, medium to very coarse; some fine gravel.....	205.0	214.7
Cretaceous system - Upper Cretaceous Series - Colorado Group:		
Carlile Formation:		
Shale, dark gray, clayey to silty.....	214.7	250.5

Test Hole #26-B-64
(A30-4-31dddd)
Dixon County

Location: SE SE SE SE sec. 31, T. 30 N., R. 4 E., approximately 14 feet north and 63 feet west of southeast corner.

Ground elevation: 1,585.0 ft (t) (Martinsburg SW 7.5 min. quadrangle).

Depth to water: 43.2 ft. (9-16-84).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Soil: silt, moderately clayey, slightly sandy, grayish brown; sand is very fine to fine; some organic material.....	0.0	1.3
Silt, slightly clayey, grayish brown; few limy nodes; some very fine sand.....	1.3	6.5
Silt, slightly clayey, slightly calcareous, yellowish brown to light olive brown; some limy nodes and iron stain; light gray from 7.4 to 10 ft; little very fine sand; pale olive below 10 ft.....	6.5	15.0
Silt, very sandy, slightly clayey, slightly calcareous, light olive gray; sand is very fine; some iron stain below 16 ft; light yellowish brown to light olive brown below 19.3 ft.....	15.0	20.0
Silt, slightly clayey, slightly sandy, slightly calcareous, light olive brown; sand is very fine.....	20.0	26.2
Silt, moderately clayey, yellowish brown; some iron stain; brown below 27.5 ft; slightly calcareous below 29 ft.....	26.2	30.0
Silt, moderately clayey, pale brown with some yellowish brown and gray; some limy areas; some iron stain.....	30.0	37.5
Clay, silty, light brownish gray, some light gray; rare gravel grains below 40 ft.....	37.5	42.0
Clay, silty, slightly calcareous, light yellowish brown.....	42.0	43.5
Clay, silty, light yellowish brown with some olive gray; some manganese and iron stain; some very fine sand.....	43.5	45.2
Clay, silty, slightly sandy, light brownish gray; sand is very fine; some manganese stain.....	45.2	48.0
Clay, silty, slightly sandy, pale brown; sand is very fine; some limy areas.....	48.0	50.0
Volcanic ash, light gray to white.....	50.0	52.0
Silt, moderately clayey, light brownish gray, some gray and light olive brown; some iron stain.....	52.0	54.3
Silt, moderately clayey, light yellowish brown; pale brown below 55 ft; sandy; sand is very fine to medium, few coarse grains; many limy grains.....	54.3	58.0

Till: clay, silty, sandy, gravelly, moderately calcareous, light yellowish brown; limy areas, limy grains; pale brown, very calcareous below 58.5 ft.	58.0	60.0
Till: clay, silty, sandy, gravelly, very calcareous, pale olive with pale brown and yellowish brown; some limy areas and dark stain.....	60.0	70.0
Till: clay, silty, sandy, gravelly, very calcareous, light olive brown; moderately calcareous below 75 ft; limy material; trace of cobbles below 85 ft.....	70.0	90.3
Till: clay, silty, sandy, gravelly, moderately calcareous, grayish brown; some limy grains; some iron stain; trace of cobbles from 93 to 94 ft.....	90.3	100.0
Till: clay, silty, sandy, moderately calcareous, brown; limy grains; grayish brown below 110 ft....	100.0	115.0
Clay, silty, moderately sandy, grayish brown to dark gray; sand is very fine to medium, some coarser grains; some dark stain; limy grains and limy areas; dark gray from 120 to 125 ft.....	115.0	127.0
Till: clay, silty, sandy, gravelly, moderately calcareous, grayish brown; some dark stain; limy grains; very dark gray from 127 to 130 ft; some yellowish brown and brownish gray below 130.7 ft..	127.0	132.5
Till: clay, silty, sandy, gravelly, moderately calcareous, brown with some yellowish brown and brownish gray; some limy grains, some iron stain; grayish brown below 135 ft.....	132.5	138.0
Clay, silty, moderately sandy, moderately calcareous, grayish brown and brownish gray; sand is very fine to fine, some medium with few coarser grains; some limy grains.....	138.0	144.0
Sand, no sample.....	144.0	149.0
Till: clay, silty, sandy, gravelly, moderately calcareous, light brownish gray; light olive gray below 151 ft.....	149.0	151.5
Till: clay, silty, sandy, moderately calcareous, light olive gray.....	151.5	154.3
Clay, silty, sandy, dark greenish gray; sand is very fine.....	154.3	155.0
Till: clay, silty, sandy, gravelly, slightly calcareous, dark gray to dark greenish gray; gray below 160 ft; some limy grains.....	155.0	170.5
Silt, very clayey, very sandy, slightly calcareous, gray with some brown.....	170.5	172.0
Sand, gravelly; fine sand to coarse gravel; much limestone, chert, ironstone and sandstone fragments.....	172.0	174.8
Sand, very fine to coarse, some very coarse.....	174.8	180.0
Sand, gravelly; fine sand to fine gravel, little medium gravel.....	180.0	190.0

Sand, slightly gravelly; very fine sand to fine gravel; some medium gravel below 200 ft.....	190.0	210.5
Silt, very clayey, slightly sandy, light brownish gray; limy areas to 214.3 ft; sand is very fine...	210.5	215.0
Silt, very clayey, grayish brown; trace of very fine sand; some dark stain; light olive gray below 218.8 ft.....	215.0	220.0
Silt, very sandy, slightly clayey, slightly calcareous, light brownish gray; sand is very fine; some lime grains.....	220.0	221.0
Silt, slightly clayey, dark gray; little very fine sand to 225 ft; trace of shell fragments below 225 ft.....	221.0	230.0
Silt, moderately clayey, dark greenish gray; dark gray below 232 ft.....	230.0	237.0
Silt, moderately clayey, gray; olive gray from 242.6 to 244.2 ft.....	237.0	245.0
Silt, moderately clayey, slightly sandy, grayish brown; sand is very fine; in part some gray below 256 ft.....	245.0	265.0
Silt, moderately clayey, moderately sandy, greenish gray; sand is very fine to medium; some chalk fragments.....	265.0	273.0
Sand, gravelly; principally chalk, ironstone and fossil fragments.....	273.0	277.5
Silt, moderately clayey, sandy, very calcareous, dark greenish gray; some Niobrara fragments.....	277.5	279.2
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Carlile Formation:		
Shale, dark gray to black, greasy.....	279.2	291.2
Shale, black, clayey; contains scattered thin limestone seams.....	291.2	300.0

Test Hole #15-A-64
(A30-4-35aabb)
Dixon County

Location: NW NW NE NE sec. 35, T. 30 N., R. 4 E., approximately 202 feet south and 1,056 feet west of northeast corner.

Ground elevation: 1,470.0 ft. (t). (Martinsburg SW 7.5 min. quadrangle).

Depth to water: Unknown. Test hole caved at 32.0 ft. (9-16-64).

Depth, in feet
From To

Quaternary System, undifferentiated:

Silt and silty sand, slightly clayey, dark brown; sand is very fine to medium.....	0.0	1.5
Sand, slightly silty; sand is very fine to medium...	1.5	5.7
Silt, moderately clayey, moderately sandy, dark brown; sand is very fine to medium.....	5.7	5.8
Silt, moderately clayey, light olive brown.....	5.8	7.5
Sand, slightly silty; sand is very fine to medium; little coarse sand below 10 ft.....	7.5	16.8
Silt, slightly clayey, light olive brown; some iron stain; some very fine sand below 18 ft; slightly calcareous from 25.5 to 30 ft; moderately calcareous below 30 ft.....	16.8	31.1
No sample, lost circulation.....	31.1	32.0
Silt, slightly clayey, moderately sandy, moderately calcareous, olive; sand is very fine; light olive from 50 to 55 ft; slightly calcareous below 62.5 ft.....	32.0	65.0
Silt, slightly clayey, moderately sandy, moderately calcareous, olive gray; sand is very fine.....	65.0	68.0
Sand, gravelly; coarse sand to very fine gravel.....	68.0	68.2
Silt, sandy to sandy silt, slightly clayey, olive gray; sand is very fine to fine.....	68.2	70.0
Silt, very sandy, olive gray; sand is very fine to fine; some medium.....	70.0	75.0
Sand, silty; sand is very fine to medium; some coarse sand to fine gravel below 78 ft.....	75.0	82.0
Silt, very sandy, slightly clayey, gray with green tint; sand is very fine to medium; olive gray from 82.5 to 83.5 ft; trace of coarse to very coarse sand.....	82.0	85.0
Sand, silty; sand is very fine to coarse; trace of very coarse.....	85.0	87.5
Sand, gravelly; fine sand to fine gravel; little medium gravel; trace of coarse gravel below 100 ft.....	87.5	106.0
Clay, silty, greenish gray.....	106.0	109.0
Clay, silty, sandy, light olive gray; sand is very fine; light olive brown below 110 ft.....	109.0	110.1

Clay, silty, sandy, pale brown; sand is very fine...	110.1	112.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, pale yellow, chalky.....	112.0	120.0

Test Hole #22-B-64
(A30-5-3bcbc)
Dixon County

Location: SW NW SW NW sec. 3, T. 30 N., R. 5 E., approximately 1,657 feet south and 42 feet east of northwest corner.
 Ground elevation: 1,402.0 ft. (t). (Martinsburg 7.5 min. quadrangle).
 Depth to water: 90.5 ft. (9-16-64).

Depth, in feet
 From To

Quaternary System, undifferentiated:

Silt, slightly clayey, slightly calcareous, light olive brown; some iron stain; moderately calcareous from 5 to 25 ft.....	0.0	25.5
Silt, slightly clayey, slightly calcareous, light olive brown; some dark stain; grayish brown below 30 ft.....	25.5	32.0
Silt, slightly clayey, slightly sandy, slightly calcareous, pale brown; sand is very fine to medium; iron stain below 32.4 ft.....	32.0	32.8
Sand, gravelly; fine sand to coarse gravel; silty from 32 to 34 ft, and from 37 to 41 ft.....	32.8	42.0
Till: clay, silty, sandy, gravelly, slightly calcareous, yellowish brown; some iron stain; moderately calcareous below 42 ft; light gray and yellowish brown.....	42.0	43.4
Silt, moderately sandy, slightly clayey, moderately calcareous, light gray; sand is very fine to very coarse.....	43.4	44.3
Till: clay, silty, sandy, gravelly, slightly calcareous, light olive gray, some yellowish brown; some iron stain; some limy areas.....	44.3	49.2
Till: clay, silty, sandy, slightly gravelly to 50 ft; slightly calcareous, gray; some iron stain, olive gray and yellowish brown.....	49.2	60.0
Till: clay, silty, sandy, slightly calcareous, gray to dark gray; some iron stain below 75 ft.....	60.0	82.2
Till: clay, silty, sandy, slightly calcareous, light gray to gray; some iron stain; few limy nodes.....	82.2	84.1
Silt, very clayey, moderately sandy, slightly calcareous, light olive gray; sand is very fine to coarse; some limy grains; dark stain.....	84.1	84.4
Gravel and sand; principally reworked limestone fragments and quartz.....	84.4	85.0
Silt, moderately clayey, light brownish gray; some iron stain.....	85.0	90.0
Silt, slightly clayey, light brownish gray to grayish brown.....	90.0	101.7

Silt, slightly clayey, slightly sandy, gray, some light brownish gray.....	101.7	105.2
Silt, very clayey, grayish brown to olive gray.....	105.2	116.0
Silt, very clayey, light brownish gray; moderately clayey below 120 ft; some very fine to fine sand; slightly calcareous below 128.5 ft.....	116.0	130.0
Silt, moderately clayey, moderately sandy, slightly calcareous, grayish brown; sand is very fine to fine.....	130.0	131.0
Sand, very silty, moderately clayey, slightly calcareous, brown; sand is very fine to medium; some coarse.....	131.0	133.2
Silt, moderately clayey, sandy, slightly calcareous, light brownish gray; sand is very fine to medium..	133.2	140.0
Silt, very sandy, moderately clayey, slightly calcareous, light gray to light brownish gray; few limy grains below 143.8 ft.....	140.0	145.3
Sand, silty in part; sand is very fine to medium with a few coarser grains.....	145.3	147.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Carlile Formation:		
Shale, dark gray, clayey; contains pyrite and phosphatic fossil fragments.....	147.0	156.7
Limestone, dark gray.....	156.7	157.1
Shale, gray, clayey to silty.....	157.1	170.6
Shale, light gray, clayey, sticky.....	170.6	171.2
Shale, very dark gray, silty, clayey and carbonaceous.....	171.2	174.8
Shale, dark gray, clayey, bentonitic.....	174.8	180.5

Test Hole #21-B-64
(A30-5-15dccd)
Dixon County

Location: SE SW SW SE sec. 15, T. 30 N., R. 5 E., approximately 6 feet north and 2,228 feet west of southeast corner.
 Ground elevation: 1,427.0 ft. (t). (Martinsburg 7.5 min. quadrangle).
 Depth to water: 101.4 ft. (8-21-64).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Roadfill.....	0.0	1.5
Silt, slightly clayey, moderately calcareous, olive; some limy nodes to 5 ft; slightly calcareous below 5 ft; olive brown; some iron stain below 10 ft....	1.5	29.5
Silt, slightly clayey, slightly calcareous, light yellowish brown; light olive brown below 30 ft; some iron stain below 35 ft.....	29.5	40.0
Silt, slightly clayey, light yellowish brown; some iron stain; olive below 46.5 ft; some very fine to fine sand below 51 ft.....	40.0	54.0
Silt, moderately clayey, slightly calcareous, brown; some iron stain; slightly sandy below 55 ft; sand is very fine to fine; some limy nodes.....	54.0	55.8
Silt, moderately clayey, moderately calcareous, slightly sandy, yellowish brown; sand is very fine to fine; slightly calcareous below 59 ft; little very fine gravel.....	55.8	60.0
Silt, moderately clayey, brown; some very fine to fine sand; black stain; some limy nodes; few fine to medium gravel grains below 65 ft.....	60.0	71.5
Till: clay, silty, sandy, gravelly, mottled yellowish brown and gray; mottled light yellowish brown to brownish yellow below 72.9 ft; some limy areas.	71.5	80.0
Till: clay, silty, moderately calcareous, brownish yellow; gray to pale brown below 85 ft.....	80.0	91.8
Till: clay, silty, sandy, gravelly, moderately calcareous, light yellowish brown; some iron stain...	91.8	94.0
Sand, gravelly; very fine sand to medium gravel.....	94.0	119.0
Silt, very clayey, sandy, moderately calcareous, light gray; sand is very fine; light gray to light brownish gray below 124 ft.....	119.0	125.0
Silt, moderately clayey, moderately sandy, very calcareous, pale brown; sand is very fine to fine with some medium; some volcanic ash; some limy areas and nodes.....	125.0	135.0
Silt, moderately clayey, moderately sandy, moderately calcareous, brownish gray; sand is very fine to fine; gray below 142 ft.....	135.0	145.0

Silt, moderately clayey, greenish gray; gray to dark gray below 148.8 ft; some limy grains and areas below 163 ft.....	145.0	161.0
Silt, moderately clayey, slightly sandy, gray to dark gray; sand is very fine to fine, some rusty grains; light olive gray below 163 ft; limy areas below 165 ft.....	161.0	170.0
Silt, slightly clayey, slightly sandy, light brownish gray; sand is very fine to fine.....	170.0	172.8
Sand, silty; sand is very fine to very coarse.....	172.8	173.4
Silt, moderately clayey, sandy, light brownish gray; sand is very fine to fine.....	173.4	174.2
Sand, gravelly, silty; very fine sand to medium gravel.....	174.2	174.8
Silt, moderately clayey, moderately sandy, light yellowish brown; very fine to very coarse sand; some medium gravel.....	174.8	175.4
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Carlile Formation:		
Shale, gray mottled with red, clayey; contains carbonaceous streaks.....	175.4	176.0
Shale, dark gray, clayey; contains some thin siltstone zones.....	176.0	181.4
Shale, dark gray, clayey; contains limy zones and pyrite.....	181.4	205.0
Shale, dark gray, clayey; contains limy specks.....	205.0	210.0

Test Hole #20-B-64
(A30-5-28dddc)
Dixon County

Location: SW SE SE SE sec. 28, T. 30 N., R. 5 E., approximately 7 feet north and 460 feet west of southeast corner.
 Ground elevation: 1,417.0 ft. (t). (Martinsburg 7.5 min quadrangle).
 Depth to water: Unknown. (8-21-64).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Road fill.....	0.0	0.3
Silt, slightly clayey, slightly calcareous, yellowish brown.....	0.3	4.0
Silt, slightly clayey, slightly calcareous, brown; some limy grains and limonitic nodes.....	4.0	20.0
Silt, slightly clayey, slightly calcareous, brown and grayish brown; limy grains and limonitic nodes; olive brown below 27 ft.....	20.0	31.0
Silt, slightly clayey, slightly calcareous, grayish brown, some gray, some carbonaceous material; olive brown, some gray from 32 to 36 ft; some yellow and olive yellow below 36 ft.....	31.0	40.5
Silt, slightly clayey, slightly calcareous, olive; olive brown below 45 ft.....	40.5	50.0
Silt, moderately clayey, slightly calcareous, light olive brown to brownish gray.....	50.0	53.5
Silt, slightly clayey, slightly calcareous, light yellowish brown; grayish brown below 60.3 ft.....	53.5	62.7
Silt, moderately clayey, brown; sandy below 64.1 ft; sand is very fine to fine; yellowish brown to yellow below 65 ft.....	62.7	66.3
Till: clay, silty, sandy, gravelly, slightly calcareous, yellowish brown; some ironstone fragments; trace limestone grains.....	66.3	69.4
Silt, very sandy, moderately clayey, brownish gray; sand is very fine to fine.....	69.4	70.0
Sand, gravelly; fine sand to medium gravel.....	70.0	82.5
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Carlile Formation:		
Shale, gray with yellow staining, clayey.....	82.5	89.9
Shale, reddish yellow and gray; contains ironstone..	89.9	92.0
Shale, gray with yellow limonitic staining, clayey; contains some ironstone and bentonite seams.....	92.0	105.0
Shale, gray to dark gray, clayey; contains some thin ironstone, bentonite and selenite seams.....	105.0	123.5
Shale, dark gray, clayey; contains thin limestone seams in upper part.....	123.5	130.5

Test Hole #16-A-64
(A30-5-30dddc)
Dixon County

Location: SW SE SE SE sec 30, T. 30 N., R. 5 E., approximately 10 feet north and 528 feet west of southeast corner.

Ground elevation: 1,517.0 ft (t) (Martinsburg SW 7.5 min. quadrangle).

Depth to water: 47.6 ft. (9-16-64).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
No sample.....	0.0	0.5
Silt, moderately sandy, slightly clayey, very calcareous, light olive brown; sand is very fine; moderately calcareous below 5 ft; some iron stain.	0.5	10.0
Silt, moderately sandy, slightly clayey, very calcareous, light olive brown; sand is very fine; mottled light gray to light olive brown below 14.5 ft; some ironstone and limy nodes.....	10.0	20.0
Silt, slightly clayey, slightly sandy, moderately calcareous, mottled light yellowish brown to light grayish olive; sand is very fine.....	20.0	22.5
Silt, slightly clayey, slightly sandy, very calcareous, olive with brown; sand is very fine; olive below 23.5 ft.....	22.5	25.0
Silt, slightly clayey, slightly sandy, moderately calcareous, pale brown with olive tint; sand is very fine; very calcareous below 29 ft.....	25.0	40.0
Silt, slightly clayey, slightly sandy, moderately calcareous, light olive; sand is very fine.....	40.0	60.0
Silt, moderately clayey, slightly sandy, slightly calcareous, bluish gray; gray with bluish tint from 62.5 to 65 ft; olive gray below 65 ft.....	60.0	67.5
Clay, silty, sandy, till like, gray with bluish tint; limy grains and limy areas.....	67.5	72.5
Till: clay, silty, sandy, gravelly, moderately to slightly calcareous, gray with some olive and brown; some limy grains and limy areas.....	72.5	81.0
Clay, silty, moderately calcareous, light grayish brown.....	81.0	82.8
Silt, very sandy, slightly clayey, slightly gravelly, black to olive brown with olive.....	82.8	84.0
Sand, silty; sand is very fine with rare very coarse sand to fine gravel.....	84.0	85.8
Sand, very fine to fine; some medium; some iron stain.....	85.8	94.0
Till: clay, silty, sandy, gravelly, moderately calcareous, light olive brown; light olive gray from 95 to 96.2 ft; olive with some gray below 100 ft; some limy grains.....	94.0	150.0

Till: clay, silty, sandy, gray with some olive gray, moderately calcareous; some pebbles below 153 ft.....	150.0	155.0
Till: clay, silty, sandy, slightly calcareous, gray; some pebbles; some olive gray below 159 ft; some chalky shale below 171.2 ft.....	155.0	176.8
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Carlile Formation:		
Shale, gray to dark gray, clayey, tough.....	176.8	178.0
Shale, very dark gray to black, clayey, tough; contains carbonaceous streaks.....	178.0	181.8
Siltstone to sandstone, very dark gray; contains carbonaceous streaks.....	181.8	183.0
Shale, gray to dark gray, clayey, tough; contains carbonaceous streaks.....	183.0	190.0

Test Hole #14-A-64
(A31-4-32adad)
Dixon County

Location: SE NE SE NE sec. 32, T. 31 N., R. 4 E., approximately 1,848 feet south and 10 feet west of northeast corner.

Ground elevation: 1,565.0 ft. (t). (Martinsburg SW 7.5 min. quadrangle).

Depth to water: Unknown. Test hole caved at 50.0 ft. (9-16-64).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
No sample.....	0.0	0.5
Silt, slightly clayey, moderately sandy, very calcareous, brown; sand is very fine.....	0.5	1.0
Silt, slightly clayey, moderately sandy, very calcareous, light olive brown; sand is very fine; some limy nodes.....	1.0	16.0
Silt, slightly clayey, moderately sandy, very calcareous, olive; sand is very fine; some iron and dark stain; moderately calcareous below 25 ft.....	16.0	33.2
Silt, slightly clayey, moderately sandy, moderately calcareous, olive gray; sand is very fine; olive below 35 ft.....	33.2	59.7
Till: clay, silty, sandy, gravelly, very calcareous, pale olive; moderately calcareous below 60 ft; light brownish yellow from 60 to 60.3 ft; pale olive with some olive gray below 60.3 ft.....	59.7	70.9
Clay, silty, slightly sandy, moderately calcareous, grayish brown.....	70.9	71.7
Till: clay, sandy, marly, pale olive with some pale yellow from 72.8 to 73.9 ft; trace of gravel grains below 73.9n ft; some iron and dark stain; some limy grains.....	71.7	86.8
Till: clay, silty, sandy, moderately calcareous, light yellowish brown; gravel grains; very calcareous below 90 ft; pale olive.....	86.8	95.0
Till: clay, silty, sandy, moderately calcareous, pale olive; some dark silicates and ironstone fragments below 97.7 ft; very calcareous below 99.5 ft.....	95.0	100.0
Till: clay, silty, sandy, slightly calcareous, olive gray; olive yellow and gravelly below 102.2 ft.....	100.0	104.3
Till: clay, silty, sandy, gravelly, moderate to in part slightly calcareous, olive yellow to light gray and olive.....	104.3	111.7
Till: clay, silty, sandy, gravelly, slightly calcareous, gray; dark gray below 115 ft; moderately calcareous below 120 ft.....	111.7	122.0

Tertiary System - Miocene Series - Ogallala Group:

Silt, pale olive, moderately sandy, slightly clayey, moderately calcareous.....	122.0	125.0
Silty sand and sandy silt, light olive gray, slightly calcareous; sand is very fine to medium.....	125.0	133.0
Silt, light olive gray, moderately sandy, slightly clayey, moderately calcareous; sand is very fine to medium; marly from 134.3 to 135 ft; light gray; pale olive below 135 ft.....	133.0	138.0
Sand, very fine to medium; some limy grains.....	138.0	139.0
Silt, light olive brown, moderately clayey, moderately sandy; sand is very fine to medium; pale brown with olive tint below 142 ft.....	139.0	156.0
Silt, brown, very clayey, slightly sandy; sand is very fine; moderately clayey below 160 ft; pale brown below 165 ft.....	156.0	180.0
Silt, light gray with a brown tint, very sandy, slightly clayey; sand is very fine to medium.....	180.0	185.0
Sand, very silty; sand is very fine to fine.....	185.0	186.0
Silt, light gray, very sandy, slightly clayey; sand is very fine to medium.....	186.0	189.0
Sand, very silty; sand is very fine to medium.....	189.0	197.0
Sand, slightly gravelly; coarse sand to fine gravel; some coarse gravel.....	197.0	199.0

Cretaceous System - Upper Cretaceous Series - Colorado Group:**Niobrara Formation:**

Shale, pale yellow, chalky, very calcareous.....	199.0	208.5
Shale, yellow, clayey, very calcareous.....	208.5	210.0
Shale, yellow, clayey to chalky; contains fossils...	210.0	217.2
Shale, gray, clayey, very calcareous; contains fossils and some thin limestone seams.....	217.2	230.0

Test Hole #23-B-64
(A31-4-36bccc)
Dixon County

Location: SW SW SW NW sec. 36, T. 31 N., R. 4 E., approximately
 2,632

feet south and 173 feet east of northwest corner.

Ground elevation: 1,501.0 ft (t) (Martinsburg SW 7.5 min. quadrangle).

Depth to water: 82.7 ft. (9-16-64).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Silt, slightly clayey, slightly calcareous, brown, some light gray; lost circulation at 7.5 ft.....	0.0	10.0
Silt, slightly clayey, slightly calcareous, dark brown; dark grayish brown from 14.2 to 15 ft; brown below 15 ft.....	10.0	20.0
Silt, slightly clayey, slightly calcareous, olive brown.....	20.0	43.0
Silt, slightly clayey, slightly calcareous, light yellowish brown to 50 ft; grayish brown to light olive brown below 50 ft.....	43.0	52.0
Sand, silty; sand is very fine to fine; few limy grains; sand is very fine to medium with some coarse below 56 ft.....	52.0	64.0
Silt, moderately sandy, slightly clayey, slightly calcareous, pale olive; sand is very fine to fine, few coarser; many limy nodes.....	64.0	65.6
Cobbles, sand and gravel, clayey; much more limestone fragments and silicates.....	65.6	66.7
Till: clay, silty, sandy, gravelly, slightly calcareous, light brown with some yellowish brown mottled light gray; light brownish gray below 68.5 ft.	66.7	70.8
Till: clay, silty, sandy, slightly calcareous, light olive brown; grayish brown to gray below 75 ft....	70.8	80.3
Till: clay, silty, sandy, gravelly, slightly calcareous, light olive brown; yellowish brown from 82.5 to 86 ft; light gray to yellowish brown below 86 ft.....	80.3	90.3
Silt, clayey, yellowish brown; rare sand grains.....	90.3	95.0
Silt, clayey, light brownish gray to pale brown; rare sand grains; some iron stain.....	95.0	99.5
Till: clay, silty, sandy, very calcareous, mottled brownish gray and grayish brown; brownish gray with some iron stain below 100 ft.....	99.5	101.0
Till: clay, silty, sandy, gravelly and pebbly, slightly calcareous, dark gray.....	101.0	105.0
Clay, silty, greenish gray; some limy nodes and areas.....	105.0	105.2

Till: clay, silty, sandy, gravelly, slightly calcareous, gray; moderately calcareous below 115 ft....	105.2	126.0
Clay, silty, slightly calcareous, gray, some brownish gray.....	126.0	130.0
Till: clay, sandy, slightly calcareous, gray.....	130.0	132.0
Clay, silty, slightly calcareous, gray; rare sand grains from 132 to 136.5 ft; some limy areas below 136.5 ft.....	132.0	145.0
Till: clay, silty, sandy, gravelly, slightly calcareous, gray.....	145.0	169.4
Clay, silty, moderately sandy, greenish gray; some limy grains.....	169.4	170.0
Till: clay, silty, sandy, gravelly, slightly calcareous, greenish gray to gray.....	170.0	176.0
Till: clay, silty, sandy, gravelly, gray; some limy material.....	176.0	181.0
Tertiary System - Miocene Series - Ogallala Group:		
Sandstone, light gray to light olive gray, silty, slightly clayey; sand is very fine to medium; slightly less clay and silt below 182 ft.....	181.0	183.5
Silt, light olive gray, very sandy, slightly clayey; sand is very fine to fine; few chalk fragments....	183.5	186.0
Sand, silty; sand is very fine to fine; some chalk grains.....	186.0	189.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Carlile Formation:		
Shale, white to pale yellow, chalky.....	189.0	193.0
Shale, gray to dark gray, clayey; carbonaceous from 193.5 to 195 ft.....	193.0	200.0
Shale, steel gray, clayey.....	200.0	217.3
Shale, dark gray, carbonaceous.....	217.3	219.7
Limestone, dark gray, silty.....	219.7	220.5

Test Hole #13-A-64
(A31-5-15ddac)
Dixon County

Location: SW NE SE SE sec. 15, T. 31 N., R. 5 E., approximately 990 feet north and 528 feet west of southeast corner.

Ground elevation: 1,428.0 ft. (t). (Burbank 7.5 min. quadrangle).

Depth to water: 95.2 ft. (9-16-64).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Road fill: no sample.....	0.0	0.3
Silt, slightly clayey, very calcareous, brown; coarse texture; some rootlets.....	0.3	0.5
Silt, moderately sandy, slightly clayey, very calcareous, yellowish brown; some rootlets; sand is very fine, some fine; olive brown below 2.5 ft; moderately calcareous below 9.1 ft; some dark stain from 9.1 to 10 ft; in part very sandy with some iron stain from 10 to 20 ft.....	0.5	75.0
Silt, moderately sandy, slightly clayey, moderately calcareous, olive; some olive brown; sand is very fine; slightly calcareous, limy nodes below 102 ft.....	75.0	102.5
Silt, moderately clayey, light olive brown; trace of very fine sand.....	102.5	104.3
Silt, moderately clayey, slightly sandy, pale olive; moderately sandy below 105.3 ft; sand is very fine, light brownish gray.....	104.3	105.7
Silt, very clayey, sandy, olive gray; sand is very fine to fine.....	105.7	107.0
Clay, sandy, grayish brown; sand is very fine to fine.....	107.0	110.0
Clay, sandy, olive gray; sand is very fine to fine; some medium to 112.6 ft.....	110.0	115.0
Clay, moderately sandy, gray to brown; sand is very fine to fine, some coarse grains; some limy grains below 118.5 ft.....	115.0	120.0
Clay, moderately sandy, marly, light to light brown; sand is fine to medium; some limy nodes; mottled greenish gray below 123 ft.....	120.0	123.5
Clay, very sandy, silty, slightly calcareous, mottled to light olive gray; sand is very fine to medium.....	123.5	124.0
Sand, very silty, marly; limy nodes; sand is very fine to medium.....	124.0	127.0
Clay, very sandy, silty, mottled light gray to light grayish brown; some reworked shale fragments; some iron stain; sand is very fine to medium with some coarse.....	127.0	128.0

Clay, shale, moderately calcareous, light yellowish brown.....	128.0	128.2
Clay, silty, sandy, moderately calcareous, light olive brown; some shale; sand is very fine to medium with some coarse.....	128.2	129.0
Sand, silty; sand is very fine to medium.....	129.0	135.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Carlile Formation:		
Shale, pale olive mottled with yellow, clayey.....	135.0	138.8
Shale, dark gray, clayey, greasy; contains thin limestone layers at 143.8 ft, and 144.4 ft.....	138.8	145.0
Shale, dark gray, clayey, greasy.....	145.0	170.0